SPECIFICATIONS FOR MAKING AIRPLANE WEATHER OBSERVATIONS

For making one airplane weather observation flight daily, Sundays and holidays included, for the Weather Bureau during the fiscal year July 1, 1938, to June 30, 1939, inclusive, in accordance with the following schedule and conditions:

For a daily flight started at 4:00 a.m. (75th Mer. Time) to 16,500 feet above sea level. By "starting" a flight is meant the actual take-off of the airplane. By "ground" is meant the point over the airport corresponding to the elevation of the floor of the instrument shelter in which the aerometeorograph is placed before being mounted on the airplane. (BIDDER MUST RETURN THESE SPECIFICATIONS WITH HIS BID. ANOTHER COPY OF THE SPECIFICATIONS WILL BE FURNISHED UPON REQUEST, IF DESIRED.)

COST PER FLIGHT.....$_____

I DEFINITION OF FLIGHT-

(a) A flight will consist of making an airplane ascent (the airplane to be instrumentally equipped as hereinafter set forth), at a rate of ascent not greater than 1,500 feet per any five-minute period or less than 1000 feet per any five-minute period.

(b) After reaching the maximum elevation the airplane will level off for one minute and then return to the ground as rapidly as practicable, proper caution being taken so that the rapid air speed will not cause the aerometeorograph to break loose from its mounting.

(c) The place of landing must be at the place of take-off unless weather conditions as indicated under par. III (a) of these specifications, make this impracticable.

(d) The entire flight must be made, as nearly as practicable, directly over the airport from which the take-off is regularly made. (This should usually be within a 10 mile radius of the airport. When this is impracticable a note should be made on the pilot's report giving the approximate distance and direction from the airport with the appropriate times.)

(e) No ascent reaching a maximum height equal to less than 20% of the difference in elevation between the ground and 16,500 feet above sea level, shall be deemed to constitute a flight within the meaning of these specifications.

(f) The maximum height of each flight will be computed and determined from the aerometeogograph record by standard Weather Bureau methods. In the event of failure of the aerometeorograph to record, payment will be made on the basis of the altimeter readings made at the maximum

elevation. Such altimeter readings will be corrected, if necessary, by the Weather Bureau, in accordance with the previous general agreement found between the altimeter indications and the height as computed by standard Weather Bureau methods.

II. SCHEDULE OF FLIGHTS-

(a) Although flights must be started as a rule at the time specified above, latitude in starting them earlier or later will be allowed under conditions set forth hereinafter.

(b) No flight shall be started earlier than 3:30 a. m. (75th Mer. Time).

(c) Flights started after 4:30 a.m. (75th Mer. Time), unless any of the conditions specified under par. VI(c) (8) of these specifications obtain, will be considered late. However, no flight shall be started after 5:00 p.m. (75th Mer. Time) on any day.

(d) Whenever a flight is delayed due to any of the conditions specified under par. VI(c) (8) of these specifications, it shall be started as soon as possible after the conditions of exemption specified under par. VI(c) (8) no longer obtain.

III. WEATHER CONDITIONS-

(a) Weather conditions will be considered unfavorable for the making of flights when,

(1) the ceiling at the airport from which the flights are regularly made is reported by the Weather Bureau as being lower than_____ feet, or,

(2) the visibility is reported by the Weather Bureau as being less than _____ miles, or,

(3) icing or wind conditions would make the take-off, landing, or flight especially hazardous for the equipment used.

(b) The Weather Bureau representative will furnish a flight forecast for any flight upon request from the pilot. However, the pilot will not be advised when to fly on account of weather conditions.

IV. REPORT OF FLIGHT-

The pilot shall submit promptly after each landing, to the local Weather Bureau representative, a written and signed statement containing a report of weather phenomena encountered or observed during the flight and also communicate this information by radio to the ground station during the flight. (Details of information desired will be found in the Appendix.)

V. EQUIPMENT AND PERSONNEL-

(a) To be furnished by the Weather Bureau.

(1) The Weather Bureau will furnish an aerometeorograph (weight approximately 7 lbs.) for recording temperature, pressure, and humidity.

(2) A representative of the Weather Bureau will mount this instrument on the airplane before each flight is begun and remove it from the airplane when the flight is terminated.

(b) To be furnished by the contractor.

(1) The contractor must furnish properly certified pilot; airplane capable of climbing 200 feet per minute at an elevation of 16,500 feet above sea level with load, including aerometeorograph, pilot, and sufficient fuel at take-off for a 3 1/2 hour flight. The airplane must be equipped with the following instruments, properly calibrated and installed and in proper operating condition:

(i) One approved Bank and Turn Indicator.

(ii) Artificial horizon.

(iii) Directional gyro.

(iv) One compass, properly damped and compensated.

(v) Air speed indicator with electrically heated pitot tube.

(vi) Approved rate of climb indicator.

(vii) One sensitive type altimeter adjustable for barometric pressure.

(viii) Complete set of engine instruments as required by the Civil Air Regulations, and in addition, manifold pressure gauges if a supercharged engine is used.

(ix) Two 4 1/2-volt flash lights with adjustable focus for observing ice formation on plane, precipitation, clouds, etc.

(x) Flares for emergency landing in compliance with Bureau of Air Commerce regulations.

(xi) One parachute of type approved by the Bureau of Air Commerce for each person carried.

(xii) One free-air thermometer.

(xiii) Vacuum pump for all gyro instruments.

(xiv) One vacuum gauge so installed as to permit measurement of the vacuum in the line of the pump driven gyroscopic instruments and also to the venturi line.

(xv) Venturi or wind driven pump for Turn and Bank Indicator. This unit shall provide required vacuum with airplane in glide, with motor fully throttled and at an indicated air speed of not to exceed 80 M.P.H.

(xvi) Lighting equipment to conform with Bureau of Air Commerce regulations.

(2) The contractor must also furnish and install on the airplane a suitable mounting apparatus for carrying the above-mentioned aerometeorograph on the airplane, including wiring, battery, and connectors for operating the electric time-recording pen. This pen is operated by means of magnet coils wound for use with either a 6- or 12-volt storage battery with an open circuit or two ordinary dry cells. No. 18 to 24 rubber covered wire or flexible cord is recommended for the connections. The aerometeorograph must be mounted as follows:

(i) On a BIPLANE between the wings as far from the fuselage as possible (not less than 6 feet), from 1/2 to 2/3 of the distance from the lower to the upper wing and even with, or in advance of, the leading edge of the upper wing. If the latter is not practicable it should be mounted from 1/2 to 2/3 of the distance back from the leading edge of the upper wing to the rear edge of the upper wing.

(ii) On a MONOPLANE, as far from the fuselage as possible (not less than 6 feet), from 1/2 to 2/3 of the distance from the leading edge to the rear edge of the

wing and as far below the wing as possible, but in no case will the distance below the wing be less than 18 inches.

(iii) The position and method of mounting the aerometeorograph must be approved by the Weather Bureau representative.

(3) The airplane must also carry complete radio equipment for two-way radiotelephone communication, consisting of one radio transmitter having a minimum of 25 watts and one receiver capable of receiving RA radio range signals for at least a 150-mile radius under normal atmospheric conditions or MRA range of 75 miles; sufficiently selective to pick up, without interference, all stations within range.

VI. PAYMENT-

(a) Payment will be made as soon after the end of each month as it is possible to audit the vouchers at the U. S. Department of Agriculture, Washington, D. C.

(b) No additional payment will be made for flights reaching higher than 16,500 feet above sea level, but for flights reaching less than 16,500 feet above sea level, payment will be made in accordance with the following percentage scale (computations will be carried to the nearest whole foot):

A percentage will be found by dividing the maximum height reached above ground by the difference in height between the ground and 16,500 feet above sea level;

(NOTE: In the following paragraphs (basic price" shall mean "the contract price of one daily flight to 16,500 feet above sea level made in accordance with these specifications".)

when this percentage is less than 100, but equal to 90 or more, a payment of 90% of basic price will be made;

when this percentage is less than 90, but equal to 80 or more, a payment of 80% of basic price will be made;

when this percentage is less than 80, but equal to 70 or more, a payment of 70% of basic price will be made;

when this percentage is less than 70, but equal to 60 or more, a payment of 60% of basic price will be made;

when this percentage is less than 60, but equal to 50 or more, a payment of 50% of basic price will be made;

when this percentage is less than 50, but equal to 40 or more, a payment of 40% of basic price will be made;

when this percentage is less than 40, but equal to 30 or more, a payment of 30% of basic price will be made;

when this percentage is less than 30, but equal to 20 or more, a payment of 20% of basic price will be made;

when this percentage is less than 20, no payment will be made for the flight.

(c) While the contractor shall have the right of decision as to whether or not any flight shall be made,

(1) there will be deducted from amounts otherwise due him liquidated damages at the rate of 100% of basic price for each day's failure to make such flight, except when the failure is due to any of the conditions specified under par. V(c) (8) of these specifications.

(2) When a flight is made (one) with an airplane not equipped as specified in par. V(b) (1) and (3) of these specifications; or (two) by a pilot not certified as specified in par. VIII(a) (1) of these specifications; or (three) with an airplane not approved for "R" or "C" as specified in par. VIII (d) of these airworthiness certificate specifications; or (four) with an unauthorized passenger as specified in par. VIII(g) of these specifications, there will be deducted liquidated damages from the amount earned by the contractor for the flight made on that day as follows:

(i) If the amount earned is 50% or less of the basic price, the liquidated damages to be deducted from the amount earned will be made equal to the amount earned.

(ii) If the amount earned is 60% or more of the basic price, the liquidated damages to be deducted from the amount earned will be 50% of the basic price.

With reference to the first sentence of this paragraph; regarding condition (one), liquidated damages will not be assessed retroactively if the Bureau of Air Commerce finds that the airplane was not completely equipped as specified in par. V(b) (1) and (3) of these specifications and the fact that the equipment was incomplete was not known to the Weather Bureau representative; regarding conditions (two) and (three), liquidated damages will not be assessed until the Bureau of Air Commerce has inspected the pilot's rating and the airplane, respectively.

(3) When a flight is started after 4:30 a.m., but not later than 6:00 a.m. (75th Mer. Time) and the delay is due to conditions other than those specified under par. VI(c) (8) of these specifications, there will be deducted liquidated damages from the amount earned by the contractor for the flight made on that day as follows:

(i) If the amount earned is 20% of basic price, the liquidated damages to be deducted from the amount earned will be 20% of basic price; or

(ii) If the amount earned is 30% or more of basic price, the liquidated damages to be deducted from the amount earned will be 25% of basic price.

(4) When a flight is started after 6:00 a.m., but not later than 5:00 p.m. (75th Mer. Time) and the delay is due to conditions other than those specified under par. VI (c) (8) of these specifications, there will be deducted liquidated damages from the amount earned by the contractor for the flight made on that day as follows:

(i) If the amount earned is 50% or less of basic price, the liquidated damages to be deducted from the amount earned will be made equal to the amount earned;

(ii) If the amount earned is 60% or more of basic price, the liquidated damages to be deducted from the amount earned will be 50% of basic price.

(5) In case any of the conditions specified under par. VI (c) (8) of these specifications prevent a flight from being started at the scheduled time, i.e., between 3:30 a.m. and 4:30 a.m., 75th Mer. Time, a period of 90 minutes will be allowed after such conditions no longer obtain. This 90-minute period will also be allowed when the weather is unfavorable at any time during the interval from 3:30 to 4:30 a.m., (75th Mer. Time). If a lapse of more than 90 minutes, but not more than 3 hours, occurs before a flight is started after such conditions no longer obtain, as determined by the Weather Bureau representative, there will be deducted liquidated damages from the amount earned by the contractor for the flight made on that day, as follows:

(i) If the amount earned is 20% of basic price, the liquidated damages to be deducted from the amount earned will be 20% of basic price; or

(ii) If the amount earned is 30% or more of basic price, the liquidated damages to be deducted from the amount earned will be 25% of basic price.

If a lapse of more than 3 hours occurs before a flight is started after such conditions no longer obtain, as determined by the Weather Bureau representative, there will be deducted liquidated damages from the amount earned by the contractor for the flight made on that day, as follows:

(iii) If the amount earned is 50% or less of basic price, the liquidated damages to be deducted from the amount earned will be made equal to the amount earned; or

(iv) If the amount earned is 60% or more of basic price, the liquidated damages to be deducted from the amount earned will be 50% of basic price.

(6) If, on any day, a flight reaching a maximum height equal to 20% or more, of the difference in elevation between the ground and 16,500 feet above sea level, but reaching less than 16,500 feet above sea level, is made at the scheduled time, i.e., between 3:30 a.m. and 4:30 a.m. (75th Mer. Time) or within the 90-minute time limit as specified in par. VI(c) (5) of the specifications, the contractor shall have the option of making one or more flights on the same day, and in such cases, when later flights are made, he will be paid, according to the maximum height reached in the later flight, provided this was higher than that reached in the earlier flight, and no deduction will then be made for the lateness of the flight.

(7) Payment will not be made for more than one flight on any one day, nor for any flight started before 3:30 a.m. or after 5:00 p.m. (75th Mer. Time) on any day.

(8) No deductions in payment will be made from amounts otherwise due the contractor for failure to start a flight on scheduled time nor for failure to make a flight on any day when the cause is due to:

(i) unfavorable weather conditions as specified under par. III(a) of these specifications;

(ii) take-offs or landings being prohibited by orders issued by Bureau of Air Commerce or airport authorities (a certificate as to the facts must be obtained in each such instance from the authorities issuing the orders and be furnished the Weather Bureau);

(iii) the field being unsafe for take-offs or landings as indicated in official "Notices to Airmen"; (A copy of this notice must be furnished the Weather Bureau).

(iv) the Weather Bureau representative not being prepared to mount the aerometeorograph on the airplane;

(v) flights not being made during the 20-day period immediately following the receipt of notice to proceed with work as specified in par. VIII(c) of these specifications;

(vi) the radio range being inoperative.

(9) If failure to make a flight on any day is due to the Weather Bureau representative not being prepared to mount the aerometeorograph on the airplane, full payment of the basic price will be made for that day. (This will also apply to cases where the pilot desired to make a later flight in accordance with Par. VI(c) (6) of these specifications.)

VII. CONTRACT-

Each bidder must furnish with his bid a guarantee bond or certified check drawn in favor of the Treasurer of the United States, as security in the amount of $300.00 guaranteeing that he will, if awarded the contract, execute formal contract and bond, such bond to be in amount of $3000.00.

VIII. GENERAL-

(a) Pilot's requirements:

(1) The pilots making these flights must hold a current commercial pilot certificate with an instrument rating or a current airline pilot certificate.

(2) Arrangements will be made by the Weather Bureau for the Bureau of Air Commerce Inspectors to inspect the instrumental equipment and installation specified herein.

(b) The Contractor must furnish the Weather Bureau on or before July 1, 1938 (or on the day on which notification of award is received if award is made after June 30, 1938) with the name of the owner of the airplane to be used in these flights, together with the type of plane and its location, and its identification mark, and name of pilot or pilots so that this information can be communicated to the Bureau of Air Commerce.

(c) Flights will be started July 1, 1938 or within 20 calendar days of receipt of notice of award of contract if such date is subsequent to June 11, 1938.

(Explanatory NOTE: The Government desires that the flights be begun July 1, 1938, if possible, but believes the contractor should be granted reasonable advance notice of award of contract. For example, if notice is received June 12, 1938, the contractor may, if necessary, delay flights until July 2, 1938; if notice is received June 13, 1938, then flights may be delayed until July 3, 1938, and similarly for subsequent dates. No payment will, however, be made for any day on which a flight is not actually made, except as provided for in par. VI(c) (9) of these specifications.)

(d) The airplanes used in these flights must have been duly inspected and approved by the Bureau of Air Commerce for "R" or "C" airworthiness certificate with the exception of the radion installation.

(e) The pilot making these flights will be required to comply with all traffic regulations promulgated by the Bureau of Air Commerce.

(f) Installation, inspection, and operation of the radio equipment shall be in accordance with the rules, regulations, and requirements of the Federal Communications Commission. The transmitter shall be operated by a radio operator possessing the proper class of radio operator license valid for the operation of the aircraft radio station as specified by the Federal Communications Commission. The chief purposes of the radio equipment are to provide a means of informing the pilot of important changes in weather conditions; to report to the ground station the conditions referred to under par. IV of these specifications and to enable the pilot to comply with air traffic regulations.

(g) In view of the frequent hazardous conditions under which these flights are made, the carrying of free or pay passengers, except a properly certified pilot or Weather Bureau representative, on these flights is prohibited. However, the contractor will not be required to carry a Weather Bureau representative on these flights.

(h) The contractor shall, without additional expense to the Government, obtain all required licenses and permits. The Government shall not be responsible for any damages to persons and property that occur as a result of the fault or negligence of the contractor in connection with the prosecution of the work.

(i) The contractor will be required to taxi the airplane to within 300 feet of the Weather Bureau Airport Station before

and after the flight for the purpose of having the instrument mounted and removed from the airplane, except when, owing to forced landing elsewhere, or to conditions on the airport, this requirement is waived on any particular flight by authority of the Weather Bureau representative. (See par. V(a) (2) of these specifications.)

(j) If the contractor fails to attain a height of 16,500 feet above sea level on more than three days during any 30 consecutive days, except when in the judgment of the Weather Bureau Officials conditions made this excusable, or for any other reason fails to perform satisfactorily the airplane service required herein, the Weather Bureau may procure such service in the open market and the contractor and his sureties will be held liable to the Government for any excess cost over the contract rate occasioned the Government thereby.

(k) The flights shall be made at the .....
.....Airport. City.....State.....
.....Elevation of ground above sea level.....ft.

(l) The Weather Bureau reserves the right to reject any or all bids.

APPENDIX

The pilot's notes referred to in par. IV of these specifications should be typewritten, if practicable, and signed by the pilot. So far as possible they will be in tabular form with the time entered at the beginning of each entry; all times being in chronological order and in a neat column. The time entries will be followed by the corresponding electric time-recording pen contact numbers. The notes should include the following data:

(a) State time and altimeter reading when,

(1) Entering and emerging from clouds, fog, smoke, haze, and/or dust.

(2) Encountering and emerging from each of the various types of precipitation.

(3) Encountering and emerging from any other unusual condition.

(4) The airplane entered or emerged from the base, top, or side of each cloud or other condition referred to.

(Each phenomenon will be listed separately. The elevation of the lower limit will precede the elevation of the upper limit. The words "Entered", "Not entered", "Emerged from" will be used in conjunction with the words given in the outline below.)

Lower Limit. For base, use word "base". For side, use word "side". When unknown whether it is base or side, use word "unknown". When airplane is already in the phenomenon and the pilot was not aware of entering it, use word "noticed" following elevation at which pilot first notices that he is in the phenomenon.

Upper Limit. For top, use word "top". For side, use word "side". When unknown whether it is top or side, use word "unknown". When airplane has emerged from phenomenon and the pilot was not aware of leaving it, use word "noticed" following the elevation at which the pilot first notices that he has emerged from the phenomenon. When airplane continued in phenomenon to the maximum height and does not emerge at a point higher than that at which it entered, use word "continued" following the maximum elevation reached.

NOTE: Special care must be taken so as not to confuse sides of clouds with their bases or tops.

(5) Ice formed on the plane, including times of beginning and ending, thickness, and type of ice formation and the parts of the plane on which it formed. It is important to classify properly the type of ice deposit. These deposits will be designated as, (1) hard ice, (2) rime, (3) frost. Hard ice will be subdivided as follows: (a) clear, (b) not clear. As complete a description of the appearance and structure of the formation as possible will be given. To aid in properly classifying the ice formation the following general descriptions are given:

HARD ICE. This is the same general type as that commonly known as glaze, which forms on the ground, trees, and other objects from rain when the temperature of these objects is below 0°C. It is usually clear and glassy in appearance but occasionally the formation is milky, i.e., translucent or opaque, due to the presence of air bubbles between the layers. This latter type should be classified under (1) hard ice (b) not clear, whereas the former type should be classified under (1) hard ice (a) clear. Hard ice is generally smooth but it might be rough when mixed with snow or sleet or when freezing takes place slowly. Under the latter conditions, ridges are likely to form.

RIME. Rime consists of hard, whitish, opaque ice pellets, or grains, frequently intermixed with a frost formation of light feathery crystalline structure. Rime deposits on mountains have been described as

snow-white, plug-like truncated cones with the small end towards the surface upon which it is deposited. The plugs showed a fibrous structure and occasionally shiny surfaces. The particles from which the plugs were composed were firmly held together but the plugs themselves could be easily separated from one another. The interior was usually of granular appearance. The spaces between the plugs were filled with a powder composed of these grains. Unlike hard ice, rime builds outward from the leading edges of the plane into a sharpnosed shape. As a rule it does not adhere to the plane as firmly as hard ice and is less resistant to the vibration and wind force encountered in flight.

FROST. This type of deposit is of light feathery crystalline structure such as is often observed on ground objects in the early morning. It is formed by sublimation, i.e., by condensation directly from the vapor to the solid state.

(6) Entering and emerging from turbulent layers, Turbulence will be classified into four degrees of intensity. The pilot need not report the first degree classification which is included merely to assist in making comparisons. In cases where no record of turbulence is made by the pilot, it will be understood that the atmosphere is either free from turbulence, or that turbulence of slight intensity prevails.

TURBULENCE SCALE

Slight turbulence: The airplane rocks gently or there occur slight isolated bumps. No adjustment of control surfaces to overcome bumps are necessary. Revolutions per minute (R.P.M.) of the motor and the air speed remain constant.

Moderate turbulence: More frequent rocking (rolling) of the airplane about the longitudinal (fuselage) axis occurs. Rolling motion is moderate. Repeated slight adjustment of the ailerons is necessary. R.P.M. of motor remain constant. Small fluctuations of the air speed occur.

Strong turbulence: Airplane difficult to keep on constant heading. Airplane (rocks) from side to side. Strong vertical bumps felt. Continual operation of the ailerons, elevator, and rudder are necessary. Those in airplane feel themselves lifted from and pressed down into seats. Sensation felt like those experienced when riding in an elevator which is being

accelerated or decelerated. Motor "revs" up and down audibly. Distinct fluctuations in the R.P.M.'s of propeller and in air speed take place.

Severe turbulence: Dropping (pancaking) or lifting up of airplane occurs. Airplane is thrown repeatedly into vertical bank position. Airplane responds to the controls with difficulty. Those in the airplane are lifted from the seats (hang by their safety belts). Audible "reving" up and down of the motor heard. Pronounced change of the airspeed and R.P.M.'s of the propeller.

(b) Estimate the elevation of any of the conditions referred to in (a) above, whenever such conditions prevail but are not actually entered by the airplane, and it is practicable to estimate their elevation with reasonable accuracy, such elevations being marked, "Estimated, not entered".

(Usually it is not necessary to give the estimated elevation of the phenomena if the condition referred to is at a horizontal distance greater than 2 miles from the airplane. In such cases one of the following phrases will be used: "Below maximum height"; "Above maximum height"; "Unknown height".)

(c) State types, and number of tenths of each type, of clouds visible to pilot during the ascent and such entries to indicate the time observed. Appropriate descriptive terms will be used when the clouds are more than 30 miles (approximately) from the airplane and their type difficult to determine. These terms will also indicate the position of the clouds in the sky with reference to the airport. Examples are: "dense cirrus sheet in distant south"; "towering cloud bank in distant west"; "line squall in distant northwest", etc..

Use the word "cloudless" whenever no clouds are observed throughout the flight.

(d) State appearance of the top of each cloud layer whenever clouds have been flown through or their elevation estimated. Tops of clouds layers will be identified by photograph numbers provided by the Weather Bureau. Whenever there is insufficient sunlight or moonlight or the visibility prevents seeing the cloud tops the reason for no observation will be given. This observation should be made after the pilot reaches a point high enough above the cloud layer to enable him to obtain a good view of the top but not at such a great height that details disappear.

(e) State time of occurrence of lightning, and/or thunder, and the direction from station observed or heard; also, indicate the approximate distance from airport in miles.

(f) Indicate vertical and oblique visibilities, as explained below, only when the flight is started between sunrise and sunset.

Vertical visibility observations will be made by noting the appearance of objects on the ground directly below the airplane and will be recorded according to the following scale (intermediate scale values half-way between those given hereunder and designated by 1/2, 1-1/2, etc., will be used when appropriate).

Scale	Criteria
0	Nothing on ground visible at all.
1	Only larger objects on ground recognized, color distinctions hardly apparent.
2	Details of objects on ground not visible, though outlines still apparent. Definite bluish (or brownish) haze veiling everything through which only reds and yellows really stand out.
3	Haze quite apparent, details of objects not easy to distinguish, though not so with the outlines, colors except reds and yellows tend to the same tone.
4	Details of ground objects easily distinguishable, colors dimmed a little, haze perceptible when looked for but not otherwise.
5	Ground objects sharp and clear; no sign of haze. (Photographs can be taken on the usual fast films without filters.)

Oblique visibility observations will be made by:

(i) Noting the most distant object visible in the directions of poorest and best visibility, respectively, and identifying those objects on a topographic map after landing.

(ii) Noting the place directly over which the plane is flying at the time the objects referred to in (1) above are observed, and identifying those objects on a topographic map after landing.

Visibility observations will be made at 5,000 and 10,000 feet above sea level and at the maximum elevation reached. Whenever a cloud layer prevails, the visibility observations will be made just before entering the cloud layer and explanatory notes made in such cases. The elevation at which each visibility observation is made should always be indicated.

(g) Cause the electric time-recording pen to mark on the meteorogram at moment of take-off and beginning of descent and whenever conditions in (a) above, occur.

(h) Indicate altimeter setting at take-off (both elevation and pressure).

(i) Indicate whether altimeter readings are above ground or above sea level.

(j) Indicate whether elevations were obtained from altimeter or otherwise.

(k) State time of reaching, and altimeter reading, at maximum elevation.

(l) Indicate all times to the nearest minute.